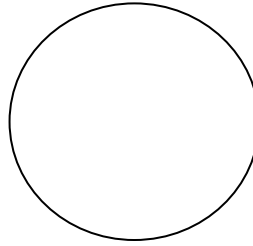


- 1) Describe the global atmospheric circulation (cell names, rotational directions, surface wind directions)! Name the winds.



- 2) Describe the development of sea-land winds (sea breezes) (Show also the wind directions in the morning and in the evening)
- 3) Explain the behaviour of and the acting forces in cyclonic winds on the northern hemisphere.
- 4) Draw a sketch of the flow around a simple rectangular block building (sharp edged cube) with named regions, approximate pressure coefficient values, and other flow features (shear layers, vortices etc.)
- 5) Which are the conditions for the separation of the flow? Draw a sketch of the boundary layer separation.
- 6) Define the gust factor! What is its importance with regard to the wind loading of buildings? How does gust factor change with growing wind velocity and with larger terrain roughness? Draw a simple diagram about the relation of measurement time (wind speed averaging time) and gust factor.
- 7) Compare friction and pressure forces in case of bluff and streamlined bodies! Give the definition and typical values (range) of the pressure and friction coefficients!
- 8) What is the atmospheric boundary layer? Describe its functions, properties, thickness, sublayers, mathematical description of mean wind speed distribution (both formulas), turbulence intensity distribution. Describe the four terrain roughness classes. How are  $z_0$  and  $\alpha$  changing between classes? (give the trend)
- 9) Draw a diagram of the full wind power spectrum. Identify parts of the spectrum, show major peaks. Give approximate time scales on the x-axis.
- 10) Draw a sketch of a boundary layer wind tunnel, with its main components, and show at least two methods of preparing a boundary layer in wind tunnel.